

Atty Docket No.: JCLA7737-R

Serial No.: 10/015,414

REMARKSPresent Status of the Application

Claims 5-12 remain pending of which claim 5 has been amended and new claims 9-12 have been added, to more explicitly and precisely describe the claimed invention. More specifically, Claim 5 has been amended recite the claim in a proper method claim format, and newly added proposed claims 8-12 have been added to further recite that the nitride tunneling layer is in direct contact with the charge trapping layer. It is believed that no new matters add by way the amendments made to claims or otherwise to the application. For at least the following reasons, Applicants respectfully submit that claims 5-12 are in proper condition for allowance. Reconsideration is respectfully requested.

INTERVIEW WITH THE EXAMINER

Applicant's Agent Jiawei Huang is grateful for the telephone interview, which was conducted on August 2, 2004 with Examiner PHAM, LY. In the interview, Jiawei Huang indicated that in our previous arguments, the unique feature of the present invention as defined in claim 5 is the use of a nitride tunneling layer. In response, Examiner PHAM, LY indicated that US-5,739,569 teaches a nitride layer serving as a tunneling layer/insulator in the non-volatile memory cell (see Fig. 6). It appears that nitride layer 16 as shown in Fig. 6 of US-5,739,569 can be broadly interpreted as a tunneling layer. However, nitride layer 16 is not in direct contact with a charge trapping layer (here the floating gate 20. In the ensuing discussions, Examiner PHAM,

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LY agreed that the US-5,739,569 fails to teach this feature and said that he would reconsider the rejection if Claim 5 specifies that the charge trapping layer and the nitride tunneling layer are in direct contact. Additionally, Examiner PHAM, LY indicated that the format of Claim 5 is improper, since it is a method claim, the recitation of structures of the memory cell should be clearly placed within the preamble. Examiner PHAM, LY's advice is gratefully acknowledged.

In response to Examiner PHAM, LY's suggestion, Applicants amended the proposed independent Claim 5 in a manner to meet the method claim format as shown above.

Furthermore, as per Examiner PHAM, LY's suggestion, Applicant hereby files the new set of claims 9-12 to recite that the charge trapping layer is in direct contact with the nitride tunneling layer as shown above. Reconsideration is respectfully requested.

However, Applicants respectfully disagree with Examiner's rejection of claims 5-8 stated in the outstanding Office Action and traverse the rejections that the proposed independent claims 5-8 patently define over Jung as follows.

Discussion of claim rejections

Response to Rejections under 35 U.S.C. 103

3. The Office Action rejected claims 5-8 under 35 U.S.C. 103(a) as being unpatentable over Jung et al. (US-6,426,897, hereinafter Jung).

In rejecting the above claims, the Office Action stated that regarding claim 5, Jung discloses a method of erasing a non-volatile memory cell using hot carrier injection method (col. 1, lines 50-53), which is similar to the claimed invention except that Jung fails to clearly specify

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that the hot carriers are injected through the nitride tunneling layer, this feature is however considered common and well known in the memory arts, wherein non-volatile flash memory mandates a nitride layer for charge trapping purposes. Since Jung did not indicate that their method be used specifically for any one particular type of non-volatile memory cell shows that the method is not limited to whether or not the non-volatile memory cell is ONO or SONOS. Therefore, it is considered obvious to one skilled in the art at the time of the invention to realize that the method of erasing a non-volatile memory cell as claimed is included and comprehensible by the disclosure of Jung.

Applicants respectfully disagree and would like to point out that, as previously argued in response to the Final Office Action dated August 25, 2004, because Jung substantially fails to specify a nitride tunneling layer (as also indicated by the Office Action), it is clear that Jung cannot meet Claim 5 in this regard.

The Office Action further asserted that this feature is however considered common and well known in the memory arts, wherein non-volatile flash memory mandates a nitride layer for charge trapping purposes. Since Jung did not indicate that their method be used specifically for any one particular type of non-volatile memory cell shows that the method is not limited to whether or not the non-volatile memory cell is ONO or SONOS. Therefore, it is considered obvious to one skilled in the art at the time of the invention to realize that the method of erasing a non-volatile memory cell as claimed is included and comprehensible by the disclosure of Jung.

Applicants respectfully disagree and would like to point out that the above reasoning of the Office Action is not well understood and accordingly request the Examiner to clearly point

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out why a nitride trapping layer would lead one skilled the art to modify the oxide-tunneling layer of ONO or SONOS type of non-volatile memory with a nitride-tunneling layer.

Applicants would like to particularly point out that it is well known that in a non-volatile memory, the charge trapping layer is clearly for charge trapping purpose and is totally different from the tunneling layer, in that they both function differently, namely the tunneling layer functions to insulate the charge trapping layer from the substrate and also allows hot carriers to penetrate there-through during the write and erase operation. Secondly, it is well known that both **ONO** (Oxide-Nitride-Oxide) and **SONOS** (Silicon-Oxide-Nitride-Oxide-Silicon) type of non-volatile memories [use oxide-tunneling layer]. [In other words, the erasure method of Jung even though not limiting to either ONO or SONOS, still would not have suggested one skilled in the art to modify the oxide-tunneling layer of ONO or SONOS non-volatile memory with a nitride-tunneling layer to achieve the features of Claim 5]. The advantage of using a nitride-tunneling layer instead of oxide-tunneling layer is that the energy barrier of the nitride-tunneling layer for a hot carrier is lower than that of the oxide-tunneling layer, and therefore the hot carrier injection can be effectively promoted and thus the operating speed can be effectively enhanced. Because Jung substantially fails to teach, suggest or disclose a nitride-tunneling layer as required by Claim 5, and therefore, Jung cannot possible render Claim 5 obvious.

For at least the forgoing reason, claims 5-8 patently define over Jung and therefore should be allowed. Reconsideration and withdrawal of these rejections is respectfully requested.

Furthermore, Applicants respectfully submit that because the newly added proposed independent Claim 9 recites, in addition to features that similar to independent Claim 5, that the

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nitride tunneling layer is direct contact with the charge trapping layer. And, therefore, Applicants similarly submit that the newly added proposed Claims 9-12 also patently define over Jung. Reconsideration is respectfully requested.

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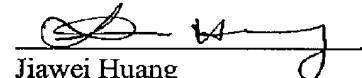
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CONCLUSION

For at least the foregoing reasons, it is believed that all pending claims 5-12 are in proper condition for allowance. If the Examiner believes that a conference would be of value in expediting the prosecution of this application, he is cordially invited to telephone the undersigned counsel to arrange for such a conference.

Respectfully submitted,
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Date: 8/26/2004


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